Laboratory Studies in Applied Microbiology

Advanced Laboratory – BIOC 318

Welcome page

Background

- Local info
- Water issues
- Projects
- Characterization
- Sample article (pdf)
- How to use Bergey's Manuals

Methods

- Rules
- Media/culture
- Aseptic technique
- Staining/interpretation
- Isolation strategies
- Assays/characterization
- Microscopy
- Cultural characteristics

Media preparation and training

- Training sessions
- Media preparation
- Laboratory safety and conduct

Experimental Biosciences

Resources

Spring semester 2015 syllabus

Welcome to our laboratory course in microbiology, which is offered the second half of each semester, with one section in fall and two sections in spring. This course will have you working in teams on two projects, one to conduct a microbiological analysis of water from a hypothetical system of lakes and a second in which you will characterize bacterial species that you isolate from locally collected samples. Most of the work will be self-scheduled and self-paced, however we must have several scheduled meetings, so please look over the detailed schedule posted below and arrange your schedule so that you can attend.

Instructors and office hours

David Caprette, Professor in the Practice
ABL 327 – third floor Anderson Biological laboratory Building
caprette@rice.edu
713-348-3498 (campus extension 3498)
Office hours TBD

Charles Stewart, Professor of Biochemistry
GBH W104
crs@rice.edu
713-348-4926 (campus extension 4926)
Office hours TBD

Preparing for the course

Review the meeting schedule for your lab section and block out the scheduled times on your calendar. You must not schedule conflicting events on the listed days at the listed times, nor let anyone schedule an event for you. We excuse absences due to circumstances beyond a student's control. Planned events such as travel for interviews are not considered to be beyond your control.

Bioc 211, Intermediate Experimental Biosciences, is a prerequisite for this course and Bioc 311, Advanced Experimental Biosciences, is highly recommended for its emphasis on teamwork, time management, writing, and quantitative skills.

Side menu

Adequate preparation is essential. Before we begin the laboratory work please look over the information under Background. The four background pages on the local community, water issues, projects, and characterizing isolates provide the rationale behind the projects and place the studies in context. You will be consulting Bergey's manuals and the methods manual as you work with your bacterial isolates. The content of training sessions and information on preparing media for the projects can be found under Media preparation and training, and I've included a convenient link to our Experimental Biosciences Resources in case you want to review how to keep a laboratory record, recommendations for technical writing, etc.

Bergey's manual

Each team will need one or two copies of Bergey's Manual of Determinative Bacteriology, 1994 or 2000 edition (they are the same), for use in identifying unknown bacteria. Here are recommended options for you:

- Each team may borrow up to two volumes from the laboratory. A $50 cash deposit will be required per volume. Your deposit will be returned provided there are no additional marks on the pages and the book is returned in its original condition, minus normal wear and tear. See "How to use Bergey's Manuals" for suggestions on how to use the tables without marking on them

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- You are welcome to purchase a copy yourself (recommended if you feel compelled to write in the book). A typical retail price is around $120, however there are bargains out there, including new Manuals for under $80 and used ones in good condition for less than $50. Make sure that you purchase the 1994 or 2000 edition.

Scheduled meetings

Event	Section 001	Section 002
Introductory presentation	Mon Mar 9, 1-2 pm, location TBA	Tues Mar 10, 1-2 pm, location TBA
Lab tour and session on media preparation	Mon Mar 9, 2-3 and 3-4 pm, ABL 141 Sessions to be assigned by team	Tues Mar 10, 2-3 and 3-4 pm, ABL 141 Sessions to be assigned by team
Teams prepare R2A and TS agar plates; brief training session on serial dilutions and spreading plates	Weds Mar 11, 1-5 pm, ABL 141 Split sessions assigned by team	Thurs Mar 12, 1-5 pm, ABL 141 Split sessions assigned by team
Process water samples for plate counts and isolates; training in aseptic technique, culture methods, and Gram staining	Mon Mar 16, starting 1 pm, ABL 141	Tues Mar 17, starting 1 pm, ABL 141
Begin to "rescue" isolates; microscopy review and training	Weds Mar 18, 1-5 pm, ABL 141 Microscopy sessions assigned by team	Thurs Mar 19, 1-5 pm, ABL 141 Microscopy sessions assigned by team
Continue characterization project, work to be self-scheduled (see recommended timetable)		
Presentation on coliform analysis	Mon Mar 23, 1-2 pm, location TBA	Tues Mar 24, 1-2 pm, location TBA
Prepare tubes for MTF	**Self-scheduled, must be prepared and sterilized by Friday Mar 27**	
Process water samples for MTF	Mon Mar 30, 1 pm, ABL 141	Tues Mar 31, 1 pm, ABL 141
Teams follow up the MTF samples	**Record presumptive test results after the break, follow w/confirmed & fecal coliform tests**	
Presentation on preparing effective posters	Mon Apr 6, 1:00 pm, location TBA	Tues Apr 7, 1:00 pm, location TBA
Posters due	Mon Apr 20, 10 am ABL 327	Mon Apr 20, 10 am ABL 327
Poster interviews	Weds Apr 22, sign up for a time	Thurs Apr 23, sign up for a time

Assignment due dates

Assignment	When due	Where to submit
Laboratory notebook copy pages	Upon completion of work or with the final paper	Instructor's IN box (office)
Team poster	At the beginning of the team presentation time	Poster session location
Characterization paper	Last day of final exams (early submissions are welcome)	Instructor's IN box (office)
Performance evaluations	Last day of classes	On line

Determining the course grade

Determining the course grade

In addition to feedback received during the course, each student will receive a complete course grade breakdown at the time that final grades are submitted.

Laboratory notebook – 20%

Each individual will maintain a laboratory notebook according to academic standards, preparing copy pages for all notes and table of contents (contents may be photocopied if the inside front cover is used). The table of contents is to be regularly updated, and pages numbered and dated, with legible entries organized with the usual sections and headings, as taught in experimental biosciences (Bios 111, 211, and 311). Record your own individual activities and observations so that your lab record reflects your personal contribution to the projects.

You are welcome to start with a partly filled notebook from another course, even one obtained from another

student. New notebooks can be purchased from the campus store or, for a MUCH better price, ordered directly from the distributor. Please purchase a Hayden-McNeil Carbonless TOP Permanent Lab Notebook, 50 Set or 100 Set, from WH Freeman (url below).

http://whfreeman.com/Catalog/product/hayden-mcneilcarbonlessspirallabnotebook%28100set%29-firstedition-hayden-mcneil/formatsandpackages/studentpurchaseoptions

Notebook grading criteria. Is the notebook kept to academic standards as learned from prior Bioc laboratory courses? Is the documentation complete? Were the notes taken in a timely manner? Do the notes reflect a reasonable effort clearly indicating that the student kept up with his/her responsibilities?

Team poster and individual interview – 30%

Each team will prepare a poster on the water analysis project, based upon the results of the MTF analysis and heterotrophic plate counts. The poster should present the rationale, all findings, data interpretation, and recommendations that address the entire scope of the project. The poster will be given a letter grade on its own merits, to serve as the starting point for determining poster grades for individual team members. Each individual grade will be adjusted, if necessary, according to the results of the poster interview.

Poster grading criteria. The quality of the science will determine most of the grade. Does the poster place the most emphasis on the most important information? Are the results presented clearly and in a meaningul way? Are the conclusions and recommendations consistent with the results? In addition, does the poster present sufficient background information so that it can stand alone? Does the overall poster present the "big picture?" Was the poster carefully prepared, organized, and proofread? Does the poster have good visual appeal?

Poster interview. Each student will meet with one or both instructors to answer two or three questions about the results, conclusions, recommendations, rationale behind the visuals, etc. Following the interviews, aa student's poster grade may be adjusted up or down depending on the individual's knowledge of the rationale, familiarity with the analysis, ability to justify the recommendations, etc.

Characterization paper – 50%

Each individual should attempt to identify his/her isolates down to species level and then select ONE isolate of interest to write up in a *Compendium* entry as described in the accompanying document (Characterization). Although only one isolate is to be written up, you are strongly advised to attempt characterization of more than one in case you lose a culture or run into a dead end. Each team should obtain as many unique isolates as they can find and divide them among team members for characterization. Criteria for evaluating the papers will include: adherence to guidellines for submission; appropriate content in each section; complete description of isolate, discrepancies accounted for; logical identification scheme, unequivocal; section on natural history reflects a reasonable effort, literature search.

Performance evaluations and "Performance factor"

Most students will not see any

Each indivudual will be asked to review his/her own performance (self evaluation) and performance of other individuals on the team. Preliminary evaluations will be due a few weeks into the course and final self- and

peer evaluations must be submitted by the final due date. These evaluations are critically important, therefore we need you to give them a lot of thought and you must be completely objective, frank, and honest. An

unrealistic evaluation of self and/or peers defeats the purpose of the assessment and will have a negative impact on the evaluator's own final grade. Unrealistic can mean either overly critical or insufficiently critical.

Each team is held accountable for responsible use of the microscopes, disposal of culture materials, and for cleaning up reusable supplies and the bench area. If these responsibilities are disregarded.

Additional policies

- Absences from scheduled meetings will be excused for the usual reasons, e.g., illness or family emergency
- Absences due to circumstances within a student's control (e.g., forgetting to show up or travel for interviews) cannot be excused and will be reflected in the performance grade; *Exception* – attending the presentation on preparing effective posters is highly recommended but optional
- All participants must engage in safe laboratory practices and abide by specific "rules" set down for this course
- An assignment that is submitted late will lose 10% per day including holidays and weekends

Honor code

As with all biosciences courses, the Rice University Honor Code applies to all personal conduct and assignments. Compliance with the honor code includes providing honest evaluations of yourself and your teammates.

Students with disabilities

Any student with a disability needing academic adjustments or accommodations should contact me (x3498 or caprette@rice.edu) as soon as possible and also contact Disabled Student Services in the Ley Student Center.

Created by David R. Caprette (caprette@rice.edu), Rice University 24 May 00
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